

REMARKS/ARGUMENTS

Description of amendments

Claims 1, 2, 4-10, and 13-15 are now pending and under examination. Applicants have amended claims 1, 5, 8-10, and 13-15; and cancelled claims 3, 11, and 12. No new matter has been added.

Allowed and allowable claims

Applicants appreciate that the Examiner has indicated claim 10 would be allowable if rewritten to overcome the rejection under 35 U.S.C. §112, second paragraph. Applicants have amended claim 10 to overcome the rejection under 35 U.S.C. §112, second paragraph. Therefore, claim 10 is allowable.

Rejection under 35 U.S.C. §112, second paragraph

Claims 5, 8-10, and 12-15 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. The rejection of the cancelled claims is now moot. Applicants have amended the remaining claims to overcome this rejection in accordance with the Examiner's helpful suggestions.

Rejections under 35 U.S.C. §103(a)

Claims 1-9 and 11-15 were rejected under 35 U.S.C. §103(a) as being obvious on various grounds as set forth in paragraphs 4-14 of the Office Action. The rejections of the cancelled claims are now moot. For the following reasons,

Applicants respectfully request reconsideration and withdrawal of the other rejections.

1. Claimed Invention in View of *Wallin* and *Otsutake*

(a) *Wallin*

Wallin, as described in the response of August 1, 2002 beginning at page 10, line 11, uses a so-called “dry air screw compressor” but does not use or disclose the so-called “fluoro-lubricant” as does Applicants’ invention. The reasons for using “fluoro-lubricant” and the problem to be solved in Applicants’ invention are given in the specification at page 9, line 18 to page 10, line 7.

Accordingly, in the previous response beginning at page 13, line 5, the differences between *Wallin* and Applicants’ invention were discussed. One of the differences is that *Wallin* does not teach using fluoro-lubricant and combing the contact angle of the two angular ball bearings as it is done in Applicants’ invention.

Moreover, in the previous response, the main feature of Applicants’ invention was described from page 9, line 12 to page 11, line 9. Again, it is emphasized that *Wallin* does not teach or suggest using fluoro-lubricant and combing contact angle of the two angular ball bearings. Further, in the previous response beginning at page 13, line 3, the differences between *Wallin* and Applicants’ invention are discussed.

(Applicants wish to take this opportunity to point out and correct some clear typographic errors in the previous response. Namely, the word “fluid” should have been “fluoro,” and the term “10°C” should have been “10°.”)

The Examiner rejected claims 1-7 and 10-15 as unpatentable over *Wallin* or unpatentable over *Wallin* in view of various other references. A common element of these rejections was the Examiner's argument that it would have been obvious to provide the bearing of *Wallin* with lubricating oil. This argument, however, is contrary to the teachings of *Wallin*. The bearing of *Wallin* is used in compressors for supplying completely oil free compressed air in the chemical and food processing industries (column 1, lines 25-29). Therefore, a person of ordinary skill in the art would not have provided the bearing of *Wallin* with lubricating oil to prevent the contamination of the compressed air by the lubricating oil.

(b) *Otsutake*

In *Otsutake*, as described in column 3, lines 34 to 42, it is preferred not to make σ_1 and σ_2 smaller than 0.15 $\mu\text{m Ra}$, because, if they are, the rolling contact surface of the mating member and the rolling element must be grounded to an ultra-high accuracy, resulting in high manufacturing costs. If two surfaces with surface roughness less than 0.15 $\mu\text{m Ra}$ are brought into contact with each other, the oil film parameter Λ naturally exceeds 1.5. This cannot meet the boundary lubrication condition provided by the invention in *Otsutake*.

Hence, in *Otsutake*, σ_1 and σ_2 cannot be out of the range of 0.15 to 0.50 $\mu\text{m Ra}$, although the ratio of σ_1 and σ_2 is 3.0 or smaller as described in the Abstract and at column 2, lines 16-24.

Moreover, although claim 1 of *Otsutake* does not call for a limitation on surface roughness, but since an oil film parameter Λ of 1.5 or smaller is required, this in effect is the substantial limitation on surface roughness.

Accordingly, since in *Otsutake* σ_1 and σ_2 by central line average roughness must be in the range of 0.15 to 0.50 $\mu\text{m Ra}$, the lower limit of 0.15 $\mu\text{m Ra}$ exceeds the upper limit of 0.05 $\mu\text{m Ra}$ claimed in new claim 1 and claims 13 and 14 of Applicants' application.

Because the Examiner did not consider the range of surface roughness in *Otsutake* and only pointed out that the ratio of surface roughness is 6.0 or smaller, which overlaps the range of 3.0 of *Otsutake*, Applicants respectfully submit that the Examiner's application of *Otsutake* in the rejection is incorrect.

In summary, (new) claim 1 of the present application cannot be rendered obvious by the combination of *Wallin* and *Otsutake*. Namely, *Wallin* and *Otsutake* do not teach or suggest (a) the raceway surface roughness of the outer ring and the inner ring of 0.05 $\mu\text{m Ra}$ or less, (b) using fluoro-lubricant, and (c) preventing the shortening of bearing life due to peeling wear, as described in the specification at page 14, lines 4 to 22.

2. Claim 8 in view of *Wallin* and *Masuda*

(a) *Wallin*

See the above discussion of *Wallin*.

(b) *Masuda*

Masuda discloses a resin retainer which has multiple pockets for accommodating the rolling elements of a rolling bearing, such that the cage pocket clearance between the interiors of a pocket and rolling elements, near the gate part and near the weld part, is made larger than the cage pocket clearance of the other pocket.

As described in paragraph of 0003 of *Masuda*, since the gate and weld parts have a larger molding shrinkage than the other parts, the size becomes smaller after molding, and it is easy for the roundness to collapse. Further, since the cage pocket clearance may decrease, it may impede the smooth rotation of the bearing.

Accordingly, *Masuda* only discloses that the cage pocket clearance between the interior of a pocket and the interior of a rolling element near the cage and weld parts is made larger than the cage pocket clearance of the other pocket in advance.

However, *Masuda* does not teach or suggest the size for the opening of the other pockets. In other words, *Masuda* does not disclose claim 8 of the present application, in which the size for the opening of a pocket having a weld line is 93% or more, and the size for the opening of at least two other pockets is 80% or more and 93% or less.

In summary, claim 8 of the present application is not rendered obvious by the combination of *Wallin* and *Masuda*. Namely, *Wallin* and *Masuda* do not teach or suggest (a) use of fluoro-lubricant and (b) the size for the opening of the other

pockets as described in the seventh embodiment of Applicants' specification (page 80, line 14 to page 89, line 5).

3. Claim 9

Niizeki (JP '356) discloses a rolling bearing which comprises an outer ring, an inner ring, rolling elements made of ceramics (Si_3N_4 , Sic, Al_2O_3 and ZrO_2 etc.) and retainer and the surface roughness of the respective raceway surfaces of the outer ring and the inner ring are set in the range of 0.1 and 3.2 μm Ra (in order to vibrate the rolling elements suitably and to provide an opportunity to contact with the rolling elements from the self-lubricating retainer and to perform shift adhesiveness of solid lubricant onto the rolling bodies in the range to which vibration does not become excessive). Since the retainer is made of self-lubricating material such as PTFE, ETFE and PFA etc., the rolling bearing can be used under an environment such as in vacuum, high temperature, corrosive gas and the like.

Niizeki (JP '356) does not teach or suggest the use of a fluoro-lubricant as taught by the present invention. In *Niizeki* (JP '356), the retainer is made of a self-lubricant material such as PTFE, which is based on solid lubricant. This is similar to *Tanaka* (which was withdrawn from the cited documents by the Examiner in the previous response). Therefore, in *Niizeki* (JP '356), a "fluoro-lubricant" with immediate effect like the present invention is not disclosed.

Moreover, it cannot be concluded that the present invention is obvious in view (1) a solid lubricant without mobility as is disclosed by *Niizeki* (JP '356), (2) a retainer having the chamfer part for reducing a centrifugal force as is disclosed by

Application No. 09/719,948
Amendment dated October 20, 2003
Response to Office Action dated June 18, 2003

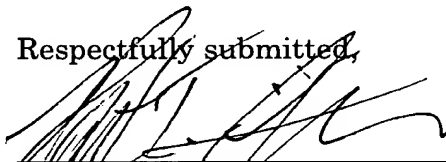
Takemura, and (3) a ball retainer having grease feeding holes extending toward the balls as is disclosed by *Tsushima*.

In light of the foregoing remarks, this application is considered to be in condition for allowance, and early passage of this case to issue is respectfully requested. If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (CAM #: 038921.49472US).

October 20, 2003

Respectfully submitted,



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